Calcasieu Estuary Remedial Investigation/Feasibility Study (RI/FS): Baseline Ecological Risk Assessment (BERA)

Appendix E4: Criteria for Evaluating Candidate Data Sets

Prepared For:

CDM Federal Programs Corporation
8140 Walnut Hill Lane, Suite 1000
Dallas, Texas 75231

Under Contract To:

Mr. John Meyer, Regional Project Manager
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue
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Prepared – October 2002 – By:

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In Association With:

United States Geological Survey
4200 New Haven Road
Columbia, Missouri 65201

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Table of Contents

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E4.1 Introduction

In recent years, the Great Lakes National Program Office (USEPA), United States Geological Survey, National Oceanic and Administration, Minnesota Pollution Control Agency, Florida Department of Environmental Protection, British Columbia Ministry of Water, Air, and Land Protection, MacDonald Environmental Sciences Ltd., and EVS Consultants have been developing a database of matching sediment chemistry and sediment toxicity data to support evaluations of the predictive ability of numerical sediment quality guidelines (SQGs) in the Great Lakes Basin and elsewhere in North America (Field *et al.* 1999; USEPA 2000a; Crane *et al.* 2000). In addition, various project-specific databases have been developed to facilitate access to and analysis of data sets to support natural resource damage assessments and ecological risk assessments at sites with contaminated sediments (MacDonald and Ingersoll 2000; Crane *et al.* 2000; MacDonald *et al.* 2001a; 2001b; Ingersoll *et al.* 2001). The goal of these initiatives was to collect and collate the highest quality data sets for assessing sediment quality conditions at contaminated sites and evaluating numerical SQGs. To assure that the data used in these assessments met the associated data quality objectives (DQOs), all of the candidate data sets were critically evaluated before inclusion in the database. However, the screening process was also designed to be flexible to assure that professional judgement could also be used when necessary in the evaluation process. In this way, it was possible to include as many data sets as possible and, subsequently, use them to the extent that the data quality and quantity dictate.

The following criteria for evaluating candidate data sets were established in consultation with an *ad hoc* Science Advisory Group on Sediment Quality Assessment (which is comprised of representatives of federal, provincial, and state government agencies, consulting firms, and non-governmental organizations located throughout North America and elsewhere worldwide). These criteria are reproduced here because they provide useful guidance on the evaluation of data that have been generated to support sediment quality assessments. In addition, these criteria can be used to support the design of sediment sampling and analysis plans, and associated quality assurance project plans (MacDonald and Ingersoll 2002).

E4.2 Criteria for Evaluating Whole-Sediment, Pore-Water, and Tissue Chemistry

Data on the chemical composition of whole sediments, pore water, and biological tissues are of fundamental importance in assessments of sediment quality conditions. For this reason, it is essential to ensure that high quality data are generated and used to support such sediment quality assessments. In this respect, data from individual studies are considered to be acceptable if:

- Samples were collected from any sediment horizon (samples representing surficial sediments are most appropriate for assessing effects on sediment-dwelling organisms and other receptors, while samples of sub-surface sediments are appropriate for assessing potential effects on sediment-dwelling organisms and other receptors, should these sediments become exposed; ASTM 2001a; ASTM 2001d; USEPA 2000b);

- Appropriate procedures were used for collecting, handling, and storing sediments (e.g., ASTM 2001b; 2001c; USEPA 2001) and samples of other media types;
- The concentrations of a variety of all chemicals of potential concern (COPCs) were measured in samples;
- Appropriate analytical methods were used to generate chemistry data. The methods that are considered to be appropriate included United States Environmental Protection Agency (USEPA) approved methods, other standardized methods [e.g., American Society for Testing and Materials (ASTM) methods, SW-846 methods], or methods that have been demonstrated to be equivalent or superior to standard methods; and,
- Data quality objectives were met. The criteria that are used to evaluate data quality included:

  (i) the investigator indicated that DQOs had been met;

  (ii) analytical detection limits were reported and lower than the probable effect concentrations (PECs) (however, detection limits < threshold effect concentration (TEC) are preferred);

  (iii) accuracy and precision of the chemistry data were reported and within acceptable ranges for the method;

  (iv) sample contamination was not noted (i.e., analytes were not detected at unacceptable concentrations in method blanks); and,

  (v) the results of a detailed independent review indicated that the data were acceptable and/or professional judgement indicated that the data set was likely to be of sufficient quality to be used in the assessment (i.e., in conjunction with author communications and/or other investigations).

E4.3 Criteria for Evaluating Biological Effects Data

Data on the effects of contaminated sediments on sediment-dwelling organisms and other aquatic species provide important information for evaluating the severity and extent of sediment contamination. Data from individual studies are considered to be acceptable for this purpose if:

- Appropriate procedures were used for collecting, handling, and storing sediments (e.g., ASTM 2001b; USEPA 2000b; 2001); Sediments were not frozen before toxicity tests were initiated (ASTM 2001a; 2001e);
- The responses in the negative control and/or reference groups were within accepted limits (i.e., ASTM 2001a; 2001c; 2001d; 2001e; 2001f; 2001g; USEPA 2000a);
- Adequate environmental conditions were maintained in the test chambers during toxicity testing (i.e., ASTM 2001a; 2001d; USEPA 2000a);
- The endpoint(s) measured were ecologically-relevant (i.e., likely to influence the organism's viability in the field) or indicative of ecologically-relevant endpoints; and,
- Appropriate procedures were used to conduct bioaccumulation tests (ASTM 2001c).

Additional guidance is presented in USEPA (1994) for evaluating the quality of benthic community data generated as part of a sediment quality assessment. These criteria include collection of replicate samples, resorting at least 10% of the samples, and independent checks of taxonomic identification of specimens. Guidance is presented in USEPA (2000c) and in Schmidt *et al.* (2000) for evaluating the quality of fish health and fish community data.

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